CAMAS CREEK (MEYERS COVE) ANADROMOUS SPECIES HABITAT IMPROVEMENT

ANNUAL REPORT - 1989

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ABSTRACT

Populations of wild and natural salmon and steelhead in the Middle Fork of the Salmon River are historically low. Until passage and flow problems associated with Columbia River dams are corrected to reduce mortalities of migrating smolts, continuance of habitat enhancements that decrease sediment loads, increase vegetative cover, remove passage barriers, and provide habitat diversity is imperative to maintain survival levels of these specially adapted fish.

Historical agricultural practices and natural events contributed to severe degradation of riparian zones and instream fish habitat in the Meyers Cove area of Camas Creek. Natural recovery of anadromous fish habitat is expected to take considerable time due to climate, elevation, and extent of degraded conditions. In 1984, Salmon National Forest personnel began implementing specific management activities in riparian areas and the stream channel to accelerate habitat recovery. The goal of these activities is to enhance the quality and quantity of spring and summer chinook salmon and summer steelhead with an emphasis on long-term survival of stocks indigenous to the Middle Fork drainage.

In 1987-88, 4.3 miles of fence was constructed establishing a riparian livestock exclosure in the Meyers Cove area of Camas Creek. One end-gap and two water-crossing corridors were constructed in 1989 to complete the fence system. The riparian exclosure has been fertilized with phosphorous-rich fertilizer to promote root growth. A stream crossing ford was stabilized with angular cobble. Streambank stabilization/habitat cover work was completed at three sites and three additional habitat structures were placed. Extensive habitat inventories were completed to identify quality/quantity of habitat available to anadromous fish.

The work accomplished was designed to promote natural revegetation of the riparian area to improve rearing habitat cover and streambank stability. Streambank work was limited to extremely unstable sites, minimizing radical alterations to an active stream channel. Enhancement activities will improve spawning, incubation, and rearing habitat for wild populations of steelhead trout and chinook salmon. Anadromous species population increases resulting from these enhancement activities will provide partial compensation for downstream losses resulting from hydroelectric developments on the Columbia River system.

This report was funded by the Bonneville Power Administration (BPA), U.S. Department of Energy, as part of BPA's program to protect, mitigate, and enhance fish and wildlife affected by the development and operation of hydroelectric facilities on the Columbia River and its tributaries. The views in this report are the author's and do not necessarily represent the views of BPA.

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INTRODUCTION

Camas Creek is a tributary to the Middle Fork of the Salmon River (Appendix A, Figure 1). Present fishery resources in Camas Creek include populations of wild chinook salmon (Oncorhynchus tshawytscha) and steelhead trout (Oncorhynchus mykiss) which are part of the last remaining pure inland runs of anadromous fish in Idaho. The Idaho Department of Fish and Game has laid groundwork to systematically restore and enhance the anadromous fish resources by developing a 5-year (1985-1990) management plan. The 1985-1990 Idaho Anadromous Fisheries Management Plan (Anon. 1985) states "The Salmon River is the most important tributary in the Snake and Columbia River drainages for anadromous fish production. The Middle Fork is the largest tributary of the Salmon River and is the most important producer of anadromous fish. The drainage flows through the Frank Church-River of No Return Wilderness, leaving the aquatic habitat conditions mostly undisturbed.... Both chinook and steelhead of the Middle Fork are uniquely adapted to the habitat conditions and long migrations distances. Preservation of the indigenous gene pools is a high priority." The primary component of this plan is protection and enhancement of wild anadromous fish populations.

Present land management and resource coordination outlined in the Salmon, National Forest Management Plan provides administrative direction to reduce and eliminate negative influences on fish habitat. The Camas Creek (Meyers Cove) Anadromous Species Habitat Improvement Plan (May and Rose, 1986) defines habitat deficiencies and describes suitable options for increasing channel stability and improving riparian conditions. The Camas Creek Anadromous Species Habitat Improvement Project is the product of that study. The project goal is to increase the quantity and vigor of wild populations of chinook salmon and steelhead trout through improvement of spawning, incubation, and rearing habitat.

The Camas Creek Anadromous Species Habitat Improvement Project conforms with the Columbia River Basin Fish and Wildlife Program measures found in Section 703 (NPPC 1987a). This project is funded by Bonneville Power Administration which has the responsibility to protect, mitigate, and enhance fish and wildlife affected by hydroelectric developments on the Columbia River and its tributaries.

Agency and Tribal Coordination

The Camas Creek Anadromous Species Habitat Improvement Project is a cooperative effort involving the U.S. Forest Service, Idaho Department of Fish and Game, the Shoshone-Bannock Tribes, and Bonneville Power Administration. Copies of the Camas Creek (Meyers Cove) Anadromous Species Habitat Improvement Plan, annual reports, and work statements are submitted to respective agencies for comment.

NEPA Compliance

The project proposal was reviewed by a Salmon National Forest Interdisciplinary Team (ID Team). The ID Team completed a draft Environmental Assessment in 1986. A Categorical Exclusion/Decision Notice was signed in March 1987 (Anon. 1987).

Study Area

Camas Creek, from Meyers Cove downstream to the Middle Fork-Salmon River, delineates the boundary between the Challis and Salmon National Forests (Appendix A, Figure 2). Because of improved access, administrative responsibilities for Meyers Cove, including the lower reach of the West Fork-Camas Creek, have been assigned to the Cobalt Ranger District, Salmon National Forest. The project area legal description is: sections 5, 6, and 7 of Township 17N, Range 17E, Boise Meridian. Elevation is approximately 5,100 feet.

The Meyers Cove reach of Camas Creek lies in a wide, low-gradient, flat-floored bottomland bordered by steep volcanic and quartzite canyonlands rising to over 9,000 feet. Located in the central Idaho mountains, the steep rugged topography is a mixture of cretaceous granitics and tertiary intrusive and extrusive igneous rocks, geologically termed the Idaho Batholith.

Average annual precipitation is 36 inches, mostly in the form of snow. Peak discharge occurs during a 2-6 week period from early May to mid-June, followed by decreasing flows through summer and winter (Anon. 1987). Dominant riparian vegetation species include Wolf's willow (Salix wolfii) and lance-leaf cottonwood (Populus acuminata), both with a grass/forb understory. Stands of Douglas-fir (Pseudotsuga menziesii) and lodgepole pine (Pinus contorta) are present in suitable riparian sites and on upper-elevation sideslopes.

Fishery Resource

The current potential smolt capacity of the existing rearing habitat in the project reach in Camas Creek is estimated at 2,231 summer steelhead and 18,779 spring or summer chinook. The estimated increase in annual smolt production as a result of habitat improvements is 930 summer steelhead and 9,854 spring or summer chinook. With improvements; the potential capacity for annual smolt production in the Meyers Cove reach of Camas Creek will be approximately 3,161 summer steelhead and 28,633 spring or summer chinook (Appendix B, Table 1).

Grazing Management

Meyers Cove was essentially pristine and undeveloped prior to 1900. From 1901 to 1969, 464 acres of the valley floor and meadows were in private ownership, grazed and irrigated for hay production. Three Forest Service grazing allotments adjoined the private inholding throughout this time period. In 1970, the United States Government purchased the private land under the authority of the Land and Water Conservation Fund Act of 1964 which provided management control for protection of anadromous fishery resources. The Camas Creek C&H allotment now includes the formerly private land.

The Camas Creek C&Ii allotment management plan is being revised and a draft is included as Attachment I. The preferred grating - the bottomland and riparian zones along Camas Creek, West Fork-Camas Creek, and Silver Creek (Appendix A, Figure 2) - is the better producing land from the homestead ranch. Since government purchase, irrigation has been discontinued and plant communities have reverted back to annual species and other less productive grasses. These pastures have been utilized in excess of their potential, while the remainder of the allotment is in good range condition.

LIMITING FACTOR ANALYSIS

The 1985-1990 Idaho Anadromous Fisheries Management Plan (Anon. 1985) states "Anadromous salmon and steelhead produced in Idaho are exposed to a complex array of natural and man-made conditions which limit return of adult fish to Idaho and which must be mitigated in order to achieve the long-term spawning and harvest objectives proposed in this plan." The Camas Creek (Meyers Cove) Anadromous Species Habitat Improvement Project addresses factors which limit the survival of juvenile anadromous fish spawned in Camas Creek.

In 1979, Salmon National Forest personnel collected aquatic habitat and riparian vegetation data for preparation of a management plan for the Camas Creek C&H grazing allotment. A 1981 study conducted by the U.S. Fish & Wildlife Service assessed anadromous fish habitat quality in Camas Creek and associated tributaries. Both assessments reflected conflicts resulting from livestock use of riparian areas.

The historic land-use activities that occurred prior to government purchase in 1970, natural runoff events, and recent land-use management associated with the grazing allotment are, in combination, responsible for degraded habitat conditions of streams and riparian zones in Meyers Cove.

Given the existing downstream passage and flow problems that have been limiting the survival of migrating smolts and returning spawning adults, the following were detected and defined as limiting for anadromous fish spawning and rearing success in the Meyers Cove reach of Camas Creek:

Riparian Vegetation

Past agricultural activity encroached upon the riparian zone and resulted in removal of the larger woody vegetation (cottonwood, alder, and willow). Recent heavy livestock use has compounded the problem by over-grazing riparian grasses and forbs, reducing the vegetative vigor and ground cover, Lack of adequate riparian vegetation has significantly reduced stream-side shade, hiding cover, food supply, and streambank stability.

Sediment Loading

Removal of riparian grasses from adjacent uplands initiated influences to stream channels. Natural revetment and channel control provided by large woody vegetation was negatively altered. This combination led to substantial changes in the stream channel as water energies began exerting influences on the streambed and non-vegetated streambanks. May and Rose rated the area's streambanks as generally unstable and sparsely vegetated with erodible materials being deposited within the stream channel. Substrate conditions are less than optimum as a result of moderate to high levels of fine material being deposited in the desirable spawning gravels.

Habitat Diversity

The study completed by the U.S. Fish & Wildlife Service revealed very low ratings for instream cover, streambank stability, water velocity, and stream width. Aggradation and channel instability had caused Camas Creek to widen, velocities to increase, and instream cover to decrease, resulting in reduced pool depths and decreased pool quality.

COAL AND OBJECTIVES

The primary goal of this project is to increase quality and quantity of spring and summer chinook salmon and summer steelhead with an emphasis on survival of stock indigenous to the Middle Fork drainage. This goal will be achieved by protecting and improving the habitat of wild stocks in the Meyers Cove reach of Camas Creek. The improvements will not only increase anadromous juvenile fish production, they are also expected to improve the vitality of smolts when the juveniles begin their downstream migration. Continued efforts to increase production and survival rates of existing stocks is imperative until mortalities of migrating smolts over Columbia River dams is reduced.

The project'objectives to attain this goal are: reduce sediment loading, improve riparian vegetation, and provide habitat diversity for anadromous fish. Accomplishing these objectives will improve the quality and increase the amount of juvenile rearing habitat. This will result in increased juvenile rearing densities and smolt production of spring and summer chinook salmon and steelhead trout.

Objective 1. Provide Optimum Riparian Vegetation

Optimum riparian vegetation is essential for prime fish habitat, but also maintains year-round.micro-climate temperatures essential for migration, spawning, incubation, and rearing. During hot summer months, over-story and stream canopy prevents water temperatures from increasing and concentrations of dissolved oxygen from decreasing (Bergstrom 1987). Overhanging shrubs and trees provide shade, hiding cover, and a food source. Fertilization and willow transplants will accelerate revegetation in areas where re-establishment is slow.

Objective 2. Reduce Sediment Loading

Stabilizing streambanks is necessary to minimize sediment delivery to the stream channel. The substrate composition essential for spawning, incubation, and food production during juvenile rearing deteriorates as levels of silt increase. Reduction of silt laden gravel will be the measurable coefficient. Embeddedness ratings collected from anadromous habitat inventories and photopoints will be used to interpret effects of streambank stabilization work. Meeting the already mentioned objective of providing optimum riparian vegetation will also contribute to reducing sediment delivery.

Objective 3. Increase Habitat Diversity

Protective cover is considered the limiting habitat type in the Meyers Cove reach of Camas Creek. Habitat diversity in the form of channel complexity (riffle/pool sequences) and in-stream cover is vital for optimum fish production. Overhead cover and shade near stream margins will be provided by overhanging riparian vegetation, turbulent water, and undercut banks. Aquatic vegetation and partially submerged rocks, logs, and root wads for in-stream cover will be provided by incorporating habitat structures into treatments of unstable streambanks.

Achieving the above goal and objectives will provide partial off-site mitigation under mandate of the Pacific Northwest Electric Power Planning and Conservation Act of 1980.

ACCOMPLISHMENTS

Implementation of the Camas Creek Habitat Improvement Project was divided into two separate but interrelated phases. Phase I inventoried the current fisheries and stream conditions, identified land use activities that were adversely affecting the aquatic habitat, and located site-specific channel instabilities in a two-mile reach of Camas Creek. The Camas Creek (Meyers Cove) Anadromous Species Improvement Plan was published in 1986 as a result of this inventory. The improvement plan includes enhancement and land-use management recommendations, a schedule of work, and estimated costs for enhancement activities.

Phase II outlined: 1) environmental assessment of enhancement activities as required by the NEPA process: 2) implementation of habitat enhancement activities; 3) maintenance, monitoring, and evaluation of project structures and changes in physical habitat and the resulting biological response.

Riparian Revegetation

In 1987, the Salmon National Forest made a management decision to restrict livestock grazing in the riparian area of Meyers Cove. To ensure grazing stock was excluded from the riparian area, 2.8 miles of four strand, barbed-wire fence and 1.5 miles of buck and pole fence was constructed enclosing 23 acres of riparian area (Appendix A, Figure 3; Appendix C, Photograph 1). The fence exclosure will result in postive effects to approximately 5.5 stream miles of Camas Creek, the West Fork-Camas Creek, and their adjacent riparian zones. Riparisn area width ranges from.120 to 290 feet (each side of stream, from streambank to fence). The mean width is 220 feet. In October and November 1988, one-half mile of fence (two water crossing corridors and one end closure), a cattle guard and six steel gates were installed. Six sections of "over water" suspension fence were constructed during the 1989 season completing the riparian exclosure system (Appendix C, Photograph 2).

A Cobalt Ranger District management decision not to seed the riparian area was made in June, 1988. This decision was based on the concept that without grazing impacts, natural revegetation will be encouraged with fertilization. In August 1988, 1500 pounds of 16-20-o-14 fertilizer was spread over the seven acres of the riparian area enclosure. Two test plots were staked and photopoints were set up to monitor results. Forest Service personnel fertilized approximately five acres of upper pasture with a phosphorous-base fertilizer. A similar fertilizer application was applied in December 1989. Additional fertilizer applications are recommended in the Spring and Fall for the next two years of this project.

Streambank Stabilization

Bank stabilization work was completed at three critical locations within the riparian enclosure (Appendix A, Figure 4). Natural revegetation of disturbed ground will be encouraged with fertilization. (See Appendix C for photographs of stabilization work.) Stabilization work will serve a dual purpose, as it will reduce sedimentation and also provide protective cover:

Site l-88:

Site l-88 required 120 yards of rock to stabilize 180 feet (linear) of streambank (completed November, 1988). Logs and woody material from an

existing debris jam were anchored in place, providing additional rearing habitat and water deflecting structures.

Site 2-88:

Work accomplished in October, 1989 at site 2-88 included bank stabilization and placing habitat structures. Woody debris was anchored parallel along an eroding bank. Logs (with root wads attached) were placed to provide in-stream cover. Twenty cubic yards of rock were hauled and placed for construction of one water-deflection structure to enhance streambank stabilization. Seven willow plugs were transplanted behind the anchored woody debris. Additionally, over 40 willow cuttings were planted and the disturbed area reseeded with native grasses to accelerate revegetation.

Site 3-88:

Work at site 3-88 was completed in 1988, and involved bank stabilization and armoring a vegetated island. This is the site of the riparian area upper end-closure and includes 120 feet of buck-and-pole fence. The bank armoring was necessary to protect this upstream section of riparian fence and cable-suspended, over-stream fence.

Twenty cubic yards of clean, angular cobble was worked into the vehicle crossing on Camas Creek. Rounded cobbles and boulders were removed from the crossing prior to rebuilding this section. The aprons/approaches to the crossing were also armored to reduce potential sedimentation.

Habitat Diversity

Two habitat structures were placed in Camas Creek in 1989. Logs were cabled then epoxy-anchored to large boulders and placed in a location that was lacking in-stream cover (Appendix I, Figures 4 and 5).

DISCUSSION

Riparian Fencing

The fence structure defining a riparian exclosure has been in-place since November 1987. Additional corridor fences have been constructed to make this exclosure cattle-tight while allowing recreational access to the West Fork-Camas Creek drainage. The Camas Creek allotment is grazed with cow/calf pairs - when small calves walk under the bottom poles of the buck-and-pole fence system they usually cannot find their way out. The cows become nervous and eventually find the weak link to the calves - the suspended fence located at the main Camas Creek crossing. This suspended fence will require additional work to keep cattle from entering the exclosure.

One alternative is to wire the existing suspended cable-plastic pipe with electric fence materials. A second alternative is to build a four-strand, barbed-wire drop fence. A third option: that-will compliment the first two alternatives is to extend the buck-and-pole fence closer to the stream.

Any alternative selected will be a high maintenance option. The electric fence will require initial construction and then spring set-up and fall tear-down. The barbed-wire drop fence will be exposed to damage by debris during spring highwater flows, If constructed, the buck-and-pole extensions will help keep pressure off wire fence sections that are above waters edge, however, the potential exists for damage by high water.

Streambank Stabilization

Camas Creek is a very active channel. Stream channel diagrams drawn for this report do not compare to diagrams in the 1986 improvement plan or 1983 aerial photos used to prepare that plan. Stream channel movement was considerable from August 1988 to August 1989. Stabilization work was completed only at critical sites where structures were necessary to deflect the stream away from non-vegetated streambanks or where armoring was necessary to prevent the stream channel from scouring a failing, unstable streambank.

Stabilization could be accomplished at one additional site (Appendix A, Figure 5 and photograph in Appendix C). This unstable site is lacking streamside woody vegetation and has a high potential for bank failure. The stream course in this reach of Camas Creek deviates annually. The benefits of encouraging natural revegetation by eliminating grazing of the riparian area outweigh the expense and results of other enhancement alternatives should the stream channel maintain its rate of movement.

Riparian Vegetation Regeneration

Not all enhancement activities listed in the Camas Creek (Meyers Cove) Anadromous Species Habitat Improvement Plan were implemented. The cost/benefit ratio of reseeding the riparian area and upper pasture was not feasible. The fencing and fertilizer applications will promote natural revegetation, a preferred alternative.

In 1989, grazing impact of the riparian exclosure occurred in isolated areas where cattle congregated (watering holes, crossings, etc.). These areas were cobble-dominated streambanks with woody vegetation community types. Two riparian pasture sites were heavily impacted as a result of-cattle being inside the exclosure an extended period of time.

Grazing Allotment Management

The Cobalt Ranger District personnel have rewritten the management plan for the Camas Creek C&H Grazing Allotment. A draft copy of this plan is included as Attachement I. Guidelines for grazing utilization have limited the use-level of vegetation in the bottomland of Meyers Cove to 45%. This use-level is independent of the use-level of the adjoining uplands. When 45% of the meadow area has been utilized the cattle must be moved from the allotment. This will reduce the grazing season and improve vegetative vigor, allowing stressed plants to regenerate.

Another inclusion of the management plan is protection of the fenced riparian area. The District will notify the permittee of cattle within the exclosure and request the cows be moved. Compliance (or non-compliance) to the operating plan by the permittee will also be a factor determining the length of grazing season and future terms of the permit.

Fish Habitat and Beavers

Beavers are increasing the quality and quantity of fish habitat, especially in the West Fork-Camas Creek and Silver Creek. Preferred beaver management is to maintain a population as builders of rearing habitat and cover. Although low flows and dams might possibly be migration barriers to adult chinook salmon, the beaver ponds provide excellent areas of rearing habitat for juveniles.

(Sufficent spawning gravels exist in the Camas Creek drainage to support chinook salmon, however, the amount of rearing habitat is limited.)

In addition to increasing fish habitat, beaver ponds perform sediment control for tributary containment and will accelerate natural regeneration of riparian vegetation. The ponds will raise surrounding water tables, increasing water availability for riparian development in adjacent low-lying areas.

MONITORING AND EVALUATION

Monitoring was completed in accordance with the plan design for the Camas Creek Anadromous Species Habitat Improvement Project (Attachment II). The recovery of riparian areas is progressing - slowly (as mentioned in Discussion-Riparian Vegetation Regeneration). Photographs taken represent the current status of riparian vegetation. Before and after photographs were taken of work completed at bank stabilization sites (Appendix C). The photographs included in this report identify streambank instability sites and provide a general overview of the project area and work accomplished. Now that construction work is complete, permanent photopoints should be established to monitor revegetation and response to treatments.

Redd Counts

On-the-ground chinook salmon redds and adult populations were counted as outlined in the monitoring plan. In 1989 a total of 27 live adult salmon were observed on 21 redds at 11 sites in the two-mile project reach (Appendix B, Table 2; Appendix A, Figures 4,5,6). This count was approximately 37% of the redds identified in 1988 (Appendix B, Table 3). The overall data was consistent with Idaho Fish and Game estimates for returning chinook salmon in the Salmon River drainage.

Annual chinook salmon redd (aerial) counts have been completed by the Idaho Department of Fish and Game since 1960 (Appendix B, Table 4). The present flight pattern covers Camas Creek from Hammer Creek upstream to Castle Creek. Redd counts prior to 1960 began at the mouth of Duck Creek and continued up Camas Creek to the Furnace and White Goat tributaries (personal communication). Five-year average counts have been compiled since 1951 (Appendix B, Table 5).

Steelhead use of Camas Creek and local tributaries was monitored by Forest Service personnel in May 1989 but redds were not mapped. Approximately 40 steelhead were observed spawning in Silver Creek in a one week period, 22 redds were identified. Comprehensive mapping and counting of steelhead redds is not feasible due to the variability of water clarity during spring runoff.

Habitat Inventories

Intensive habitat evaluations were completed in May and October 1989. The data was summarized and indicate less than optimum conditions. Abundant spawning gravels are rated fair due to embeddedness. Rearing habitat has been identified as a limiting factor: pool quality would be poor except for three or four deep, slow pools; in-stream cover is almost non-existent. Riparian zones have been depleted of over-hanging vegetation and has resulted in reduced streambank stability. The decadent, riparian woody species that remain on the adjacent streambanks provide very little stream canopy. (Stream habitat summary data sheet is in Appendix B, Table 6.)

Project Benefits

Although Forest Service personnel are conducting anadromous fish redd counts, the project benefits will be obtained from Idaho Department of Fish and Game smolt estimates. Juvenile population densities for age 0+ chinook, age 1+ steelhead, and ages 1+ & 2+ steelhead have been collected by the Idaho Department of Fish and Game and are listed in Appendix B, Table 7.

One snorkel section is identified on the map in Appendix I, Figure 5. A second snorkel section is three miles downstream. Juvenile densities collected from these sites are directly related to chinook adult escapement, embryo survival, and fry emergence in Camas Creek and its tributaries. For a more exact correlation of the project benefits, ideal density sampling would occur from late July to early August and in snorkel sections at corresponding habitat improvement and control sites within the exclosure.

MAINTENANCE

Maintenance on structures was limited in 1989. Fence repair around the riparian exclosure was minimal, three breaks in the barbed-wire fence were patched and two poles in the buck-and-pole fence were replaced. The cable-suspended fences for the West Fork-Camas Creek crossing corridor were replaced with four-strand barbed-wire "swing" fences. These short spans were built by one person in approximately four hours and can easily be rebuilt should high-water or debris damage the fence. Additional maintenance included tear-down of 280 feet of non-functional barbed-wire fence within the riparian area.

WORK REMAINING

Major construction work planned for the Camas Creek Anadromous Species Habitat Improvement Project is complete. A Cobalt District employee should have the monitoring and maintenance of the fence and supporting structures as a major part of their responsibilities. Remaining monitoring and maintenance tasks are:

- An annual coordination meeting to clarify responsibilities of the permittee and the Cobalt Ranger District is very important. Enforcement of responsibilities is vital for success of the project.

- Maintain existing pole and barbed-wire fences. Rebuild pole fence at south end of corral in Meyers Cove, move north gate from West Fork-Camas Creek crossing to south end of corral. Continue tear-down of old riparian fences.

- Establish permanent photopoints to monitor revegetation of the riparian area. Photographs already on file can be used for the baseline photographs and will determine the location of the photopoints.

- Modify the suspension fence at Camas Creek crossing. Wire the existing suspended cable-plastic pipe with electric fence materials. Additionally, the buck-and-pole fence can be extended towards the stream to reduce pressure on fence sections that are above waters edge.

- Continue fertilizing the riparian exclosure with spring and fall applications until riparian regeneration reaches 80% of streambank cover,

- Continue habitat inventory and spring chinook redd counts in early August. Conduct visual observations to document steelhead trout spawning in Camas Creek, Silver Creek, and West Fork-Camas Creek from late April to early June.

- Prepare a 5-7 year maintenance plan for: monitoring riparian revegetation, fertilizer applications, fence repair, and fish reponse to habitat improvements.

- Along with coordinating agencies, develop beaver management objectives to maintain specific population levels for achieving desired conditions of rearing habitat and riparian vegetation.

- Contract for construction of a project interpretive sign.

LITERATURE CITED

Andrews, John and Terry Hardy. 1988. Camas Creek Anadromous Species Habitat Improvement - Annual Report. 33 p. (unpublished)

Anon. 1985. 1985-1990 Idaho Anadromous Fisheries Management Plan. Idaho Department of Fish and Game, Boise, ID. 105 p.

Anon. 1987. Data Standardization Report: Habitat Capacity Estimates-Juvenile Production. Columbia Basin System Planning Group and Monitoring and Evaluation Group, Portland, OR. 6 p.

Anon. 1987. Decision Notice and Environmental Assessment for the Camas Creek (Meyers Cove) Anadromous Species Habitat Improvement. U.S. Department of Agriculture, Forest Service, Salmon National Forest, Salmon, ID. 12 p.

Anon. 1989. Camas Creek C and H Allotment Management Plan. U.S. Department of Agriculture, Forest Service, Salmon National Forest, Salmon, ID. 4 p.

Bergstrom, Dorothy. 1987. Understanding the Habitat Needs of Anadromous Salmonids - Technical Report. U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station, Portland, OR. 5 p.

May, Bruce and Robert W. Rose. 1986. Camas Creek (Meyers Cove) Anadromous Species Habitat Improvement Plan. U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife, Portland, OR. 31 p.

Northwest Power Planning Council (NPPC). 1987a. Columbia River Basin Fish and Wildlife Program. Northwest Power Planning Council, Portland, OR. 246 p.

Northwest Power Planning Council (NPPC). 1987b. Anadromous Species Presence/Absence Files for the Salmon River Basin. Northwest Power Planning Council, Portland, OR. 246 p.

APPENDIX

APPENDIX A: Figures 1 to 6

Figure 1. Project location map. Relationship *of Meyers* Cove to the Salmon River drainage and the State *of* Idaho.

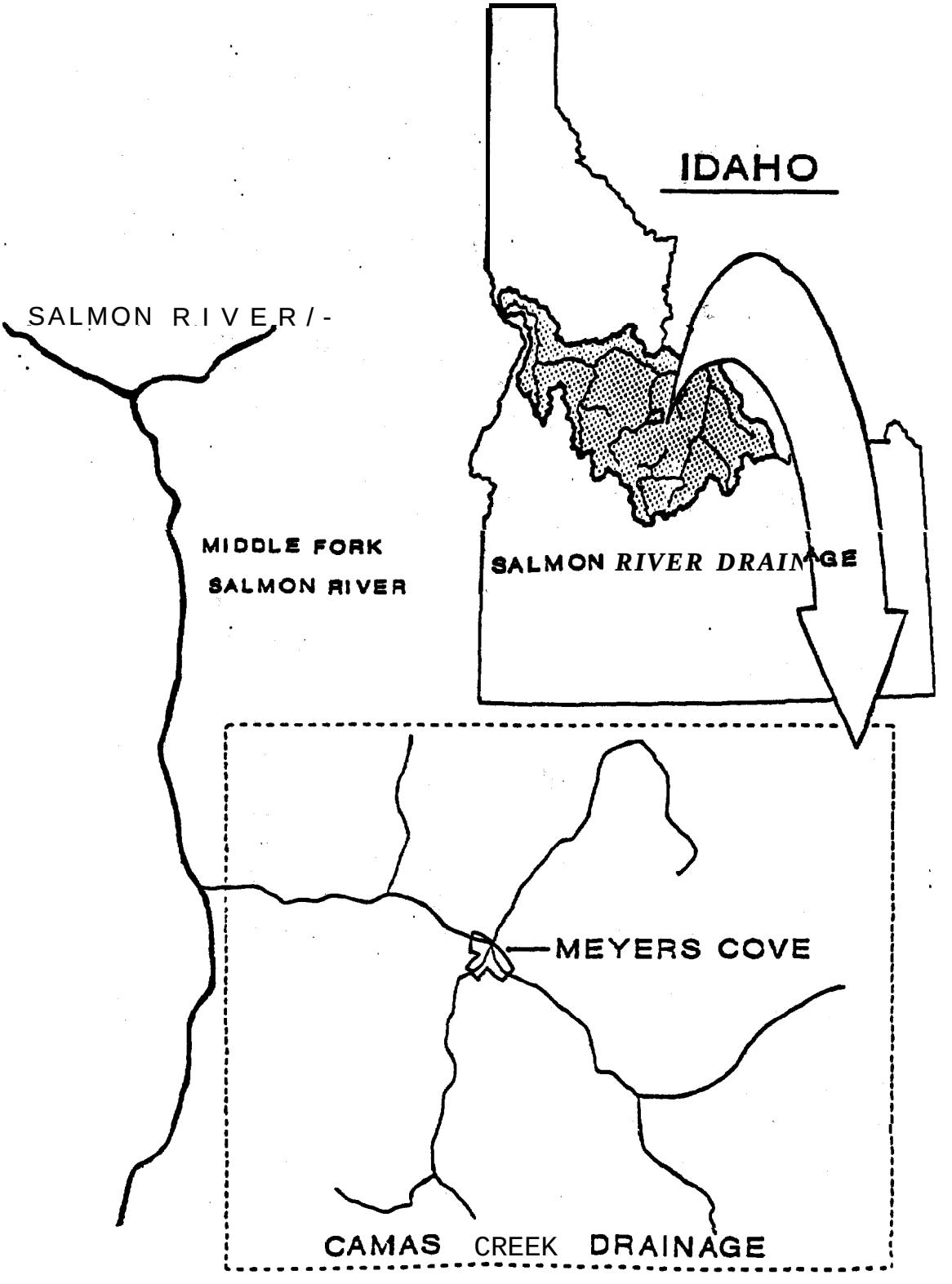


Figure 2. **Camas Creek** is the border between the Challis and Salmon National **Forests.** Outlined **area** represents the formerly private land that is no longer irrigated. **This bottomland** and adjacent riparian zone is heavily impacted by wer-grazing.

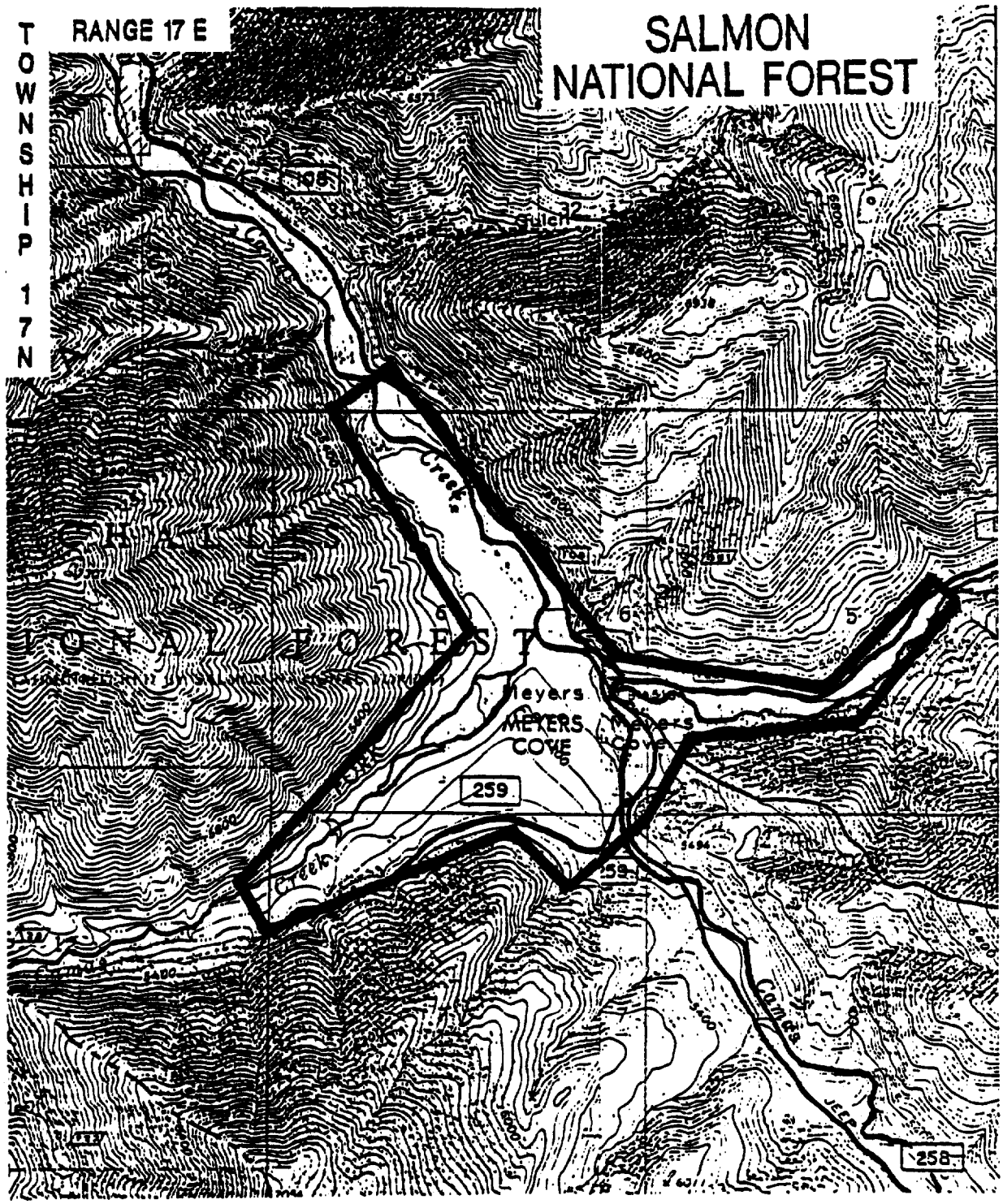


Figure 3. Schematic of riparian fence.

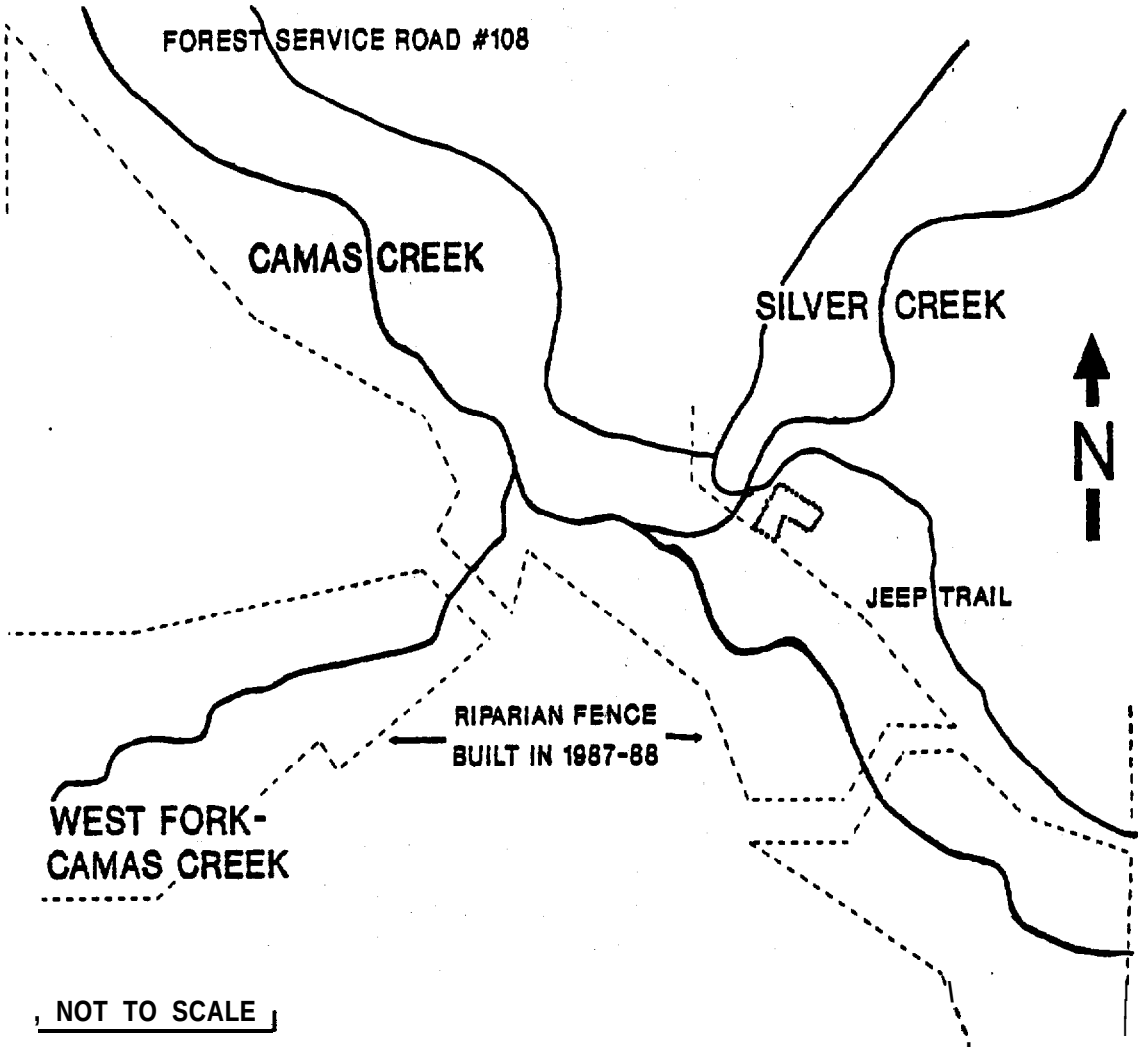


Figure 4. Upper reach: streambank stabilization/habitat structure work and August/September, 1989 spring or summer chinook salmon redd locations.

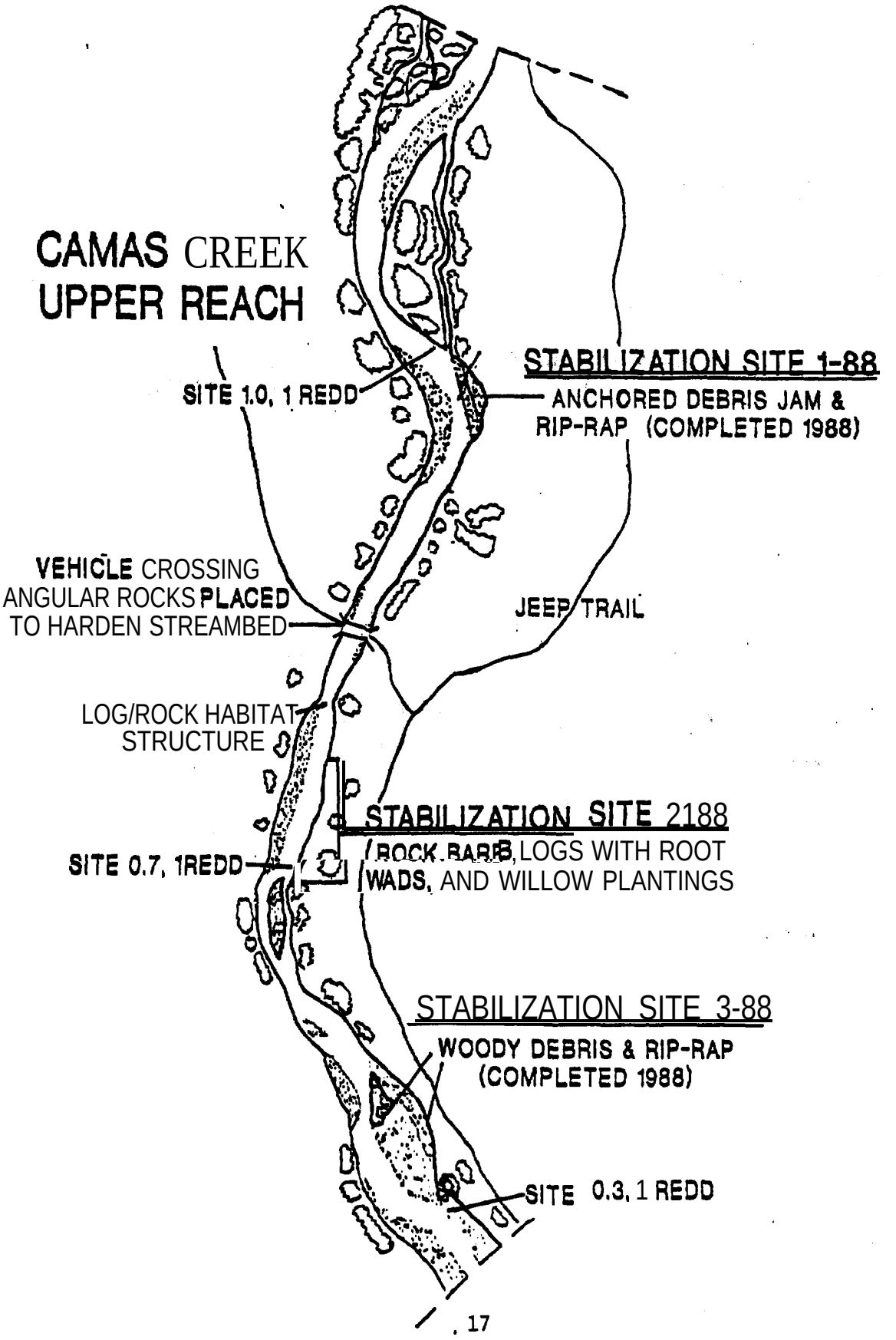


Figure 5. Middle reach: streambank stabilization/habitat structure work and August/September, 1989 chinook salmon redd locations.

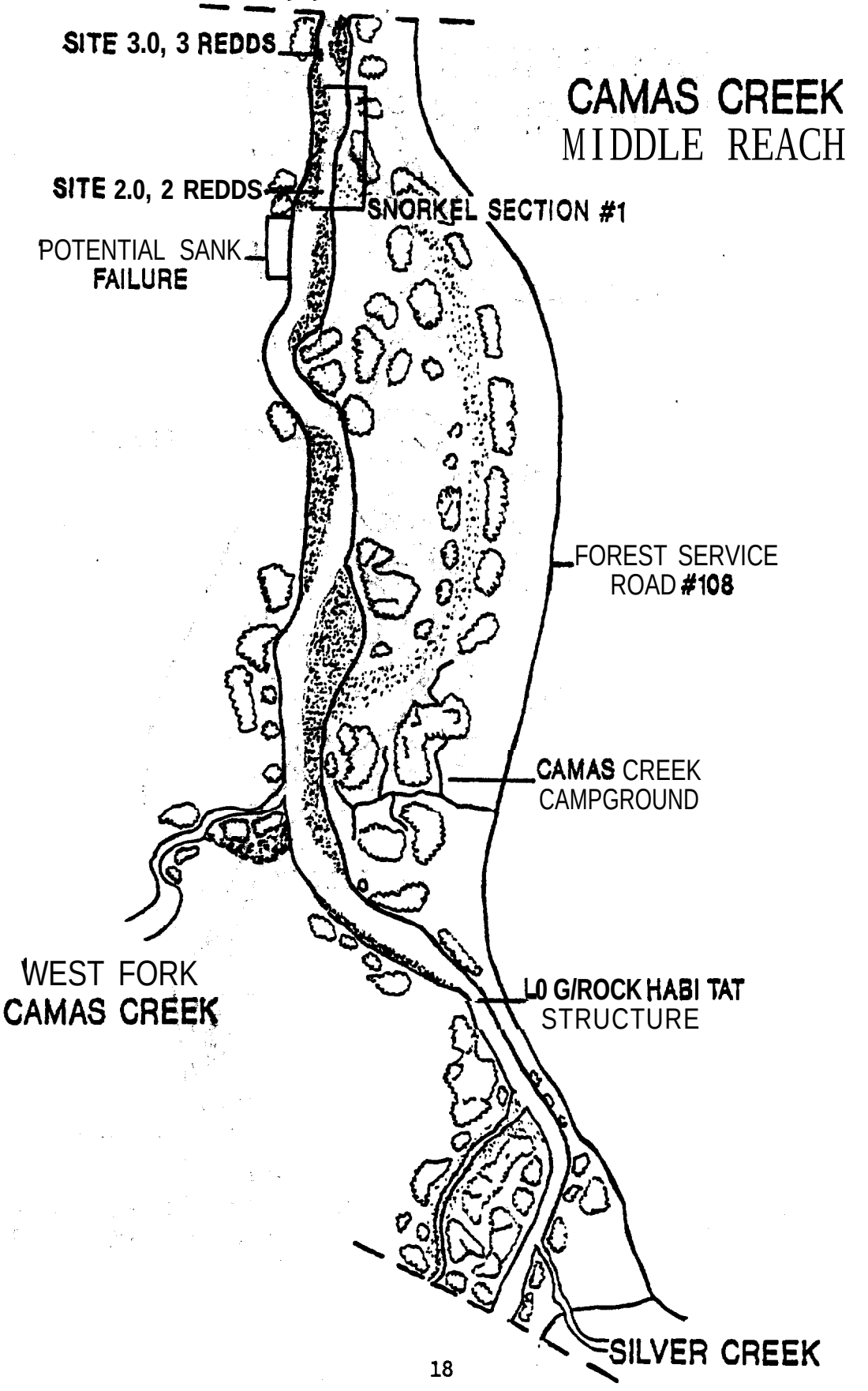
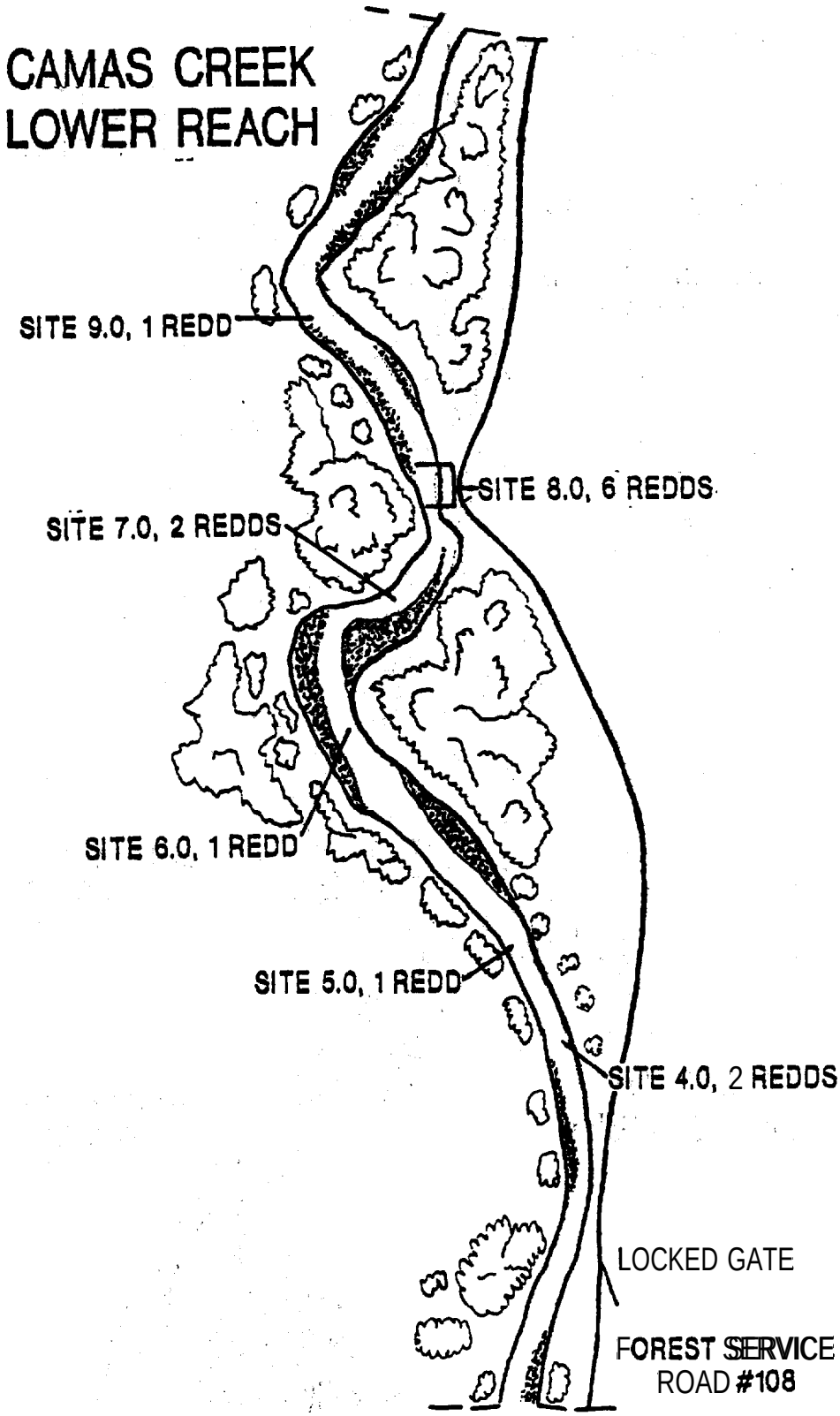


Figure 6. Lower reach, August/September, 1989 spring or summer chinook salmon redd locations.



APPENDIX **B:** Tables **1** to **7**

Table 1. Estimated annual spring or summer chinook and summer steelhead smolt production potential as a result of habitat improvements in the Meyers Cove reach of Camas Creek.

SPECIES	REARING AREA (M^2) 1/	REARING QUALITY 2/	PRESENT DENSITY (SMOLTS PER M^2) 3/	PRESENT POTENTIAL REARING CAPACITY 4/	ESTIMATED POTENTIAL REARING WITH IMPROVEMENTS 5/	ESTIMATED SMOLT INCREASE 6/
Chinook	37,187	fair/good	0.505	18,779	28,633	9,854
Steelhead	37,187	fair/good	0.060	2,231	3,161	930

1/ Based on low flow rearing area. Calculation involved comparing the stream area data in the Anadromous Species Presence/Absence Files for the Salmon Basin, (NPPC, 1987) and data collected through the extensive habitat evaluation completed by Forest Service personnel in October, 1989.

2/ The current situation in Meyers Cove reach of Camas Creek. Limiting factors include: lack of riparian vegetation (over-hanging shrubs, shade and cover), high sedimentation, and poor habitat diversity.

3/ Standard smolt density estimates taken from Columbia Basin System Planning Data Standardization Report, System Planning Group, 1987.

4/ Rearing Capacity = Rearing Area x Smolt Density

5/ Improving rearing quality to excellent/good, and multiplying rearing area by increased standard smolt density estimates of 0.770 for chinook and 0.85 for steelhead.

6/ Increase in smolt production as a'result of habitat improvements.

Table 2. Weekly spring or summer chinook salmon redd counts, August/September, 1989. On-the-ground counts were completed once per week for three weeks, in the 9,000 foot Meyers Cove reach of Camas Creek. Values listed are cumulative to identify changes over the three week period.

DATE	8/28/89		8/31/89		9/6/89	
REDDS 'STAGE	INCOMPLETE	COMPLETE	INCOMPLETE	COMPLETE	INCOMPLETE	COMPLETE
SITE						
0.3						1
0.7						1
1.0		1		1		1
2.0	1	1		2		2
3.0	1	2		3		3
4.0	1	1		2		2
5.0						1
6.0	1			1		1
7.0	1	1		2		2
8.0	2	4		6		6
9.0						
TOTALS	8	10	1	18	0	21
CHANGE			-7	+8	-1	+3

Table 3. Comparison of Chinook Salmon Redd Counts in Meyers Cove reach of Camas Creek between 1988 and 1989.

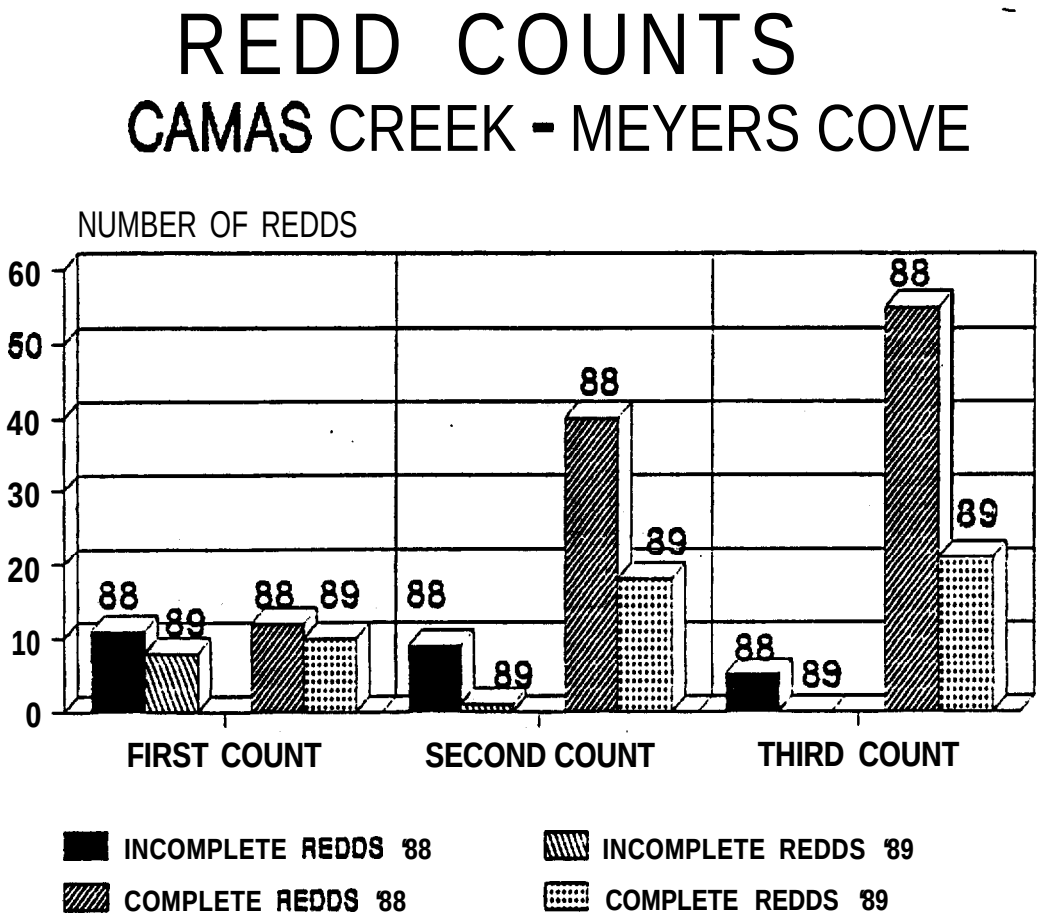
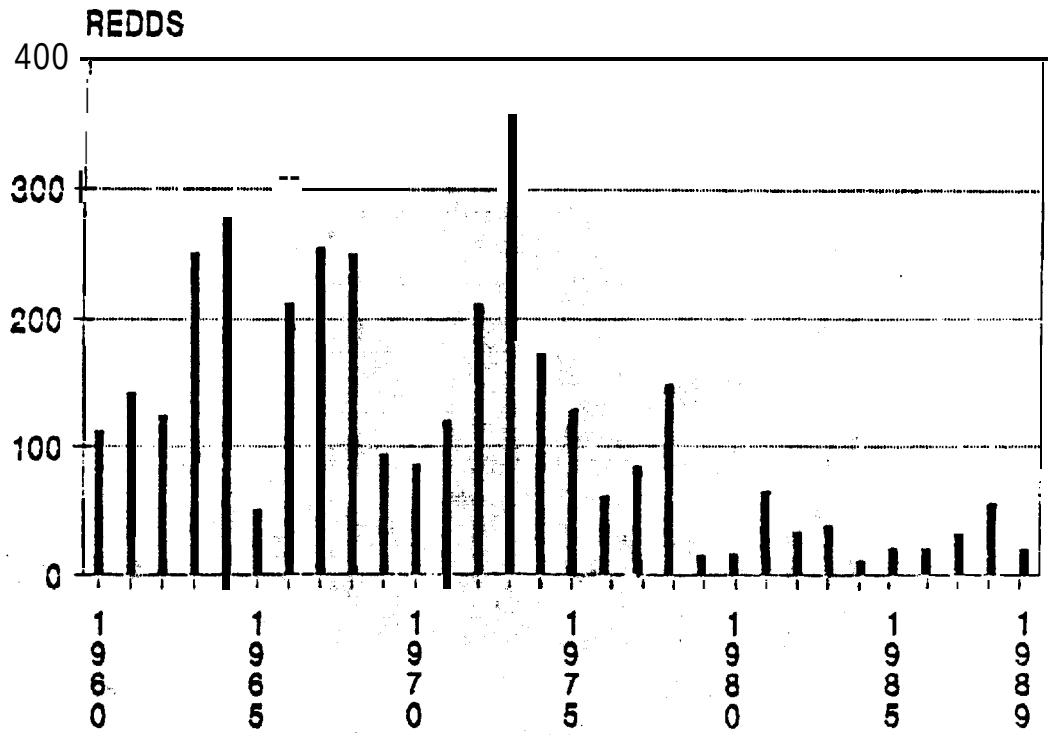


Table 4. Annual **Chinook** Salmon **Redd** Counts in **Camas** Creek for the period 1960 to 1989. These numbers were obtained from the Idaho Department of Fish and Game and **are** aerial counts in the **Camas** Creek reach from Castle Creek to Hammer Creek (approximately 8,000 meters).

ANNUAL REDD COUNTS

Year	Count	Year	Count	Year	Count
1960	112	1970	86	1980	17
1961	1 4 2	1971	120	1981	65
1962	1 2 4	1972	211	1982	33
1963	252	1973	358	1983	38
1964	279	1974	172	1984	11
1965	51	1975	128	1985	21
1966	212	1976	61	1986	11
1967	256	1977	84	1987	32
1968	251	1978	148	1988	-- (55)1/
1969	94	1979	15	1989	29 (21)2/



ANNUAL **COUNTS** FROM 1960 TO 1989

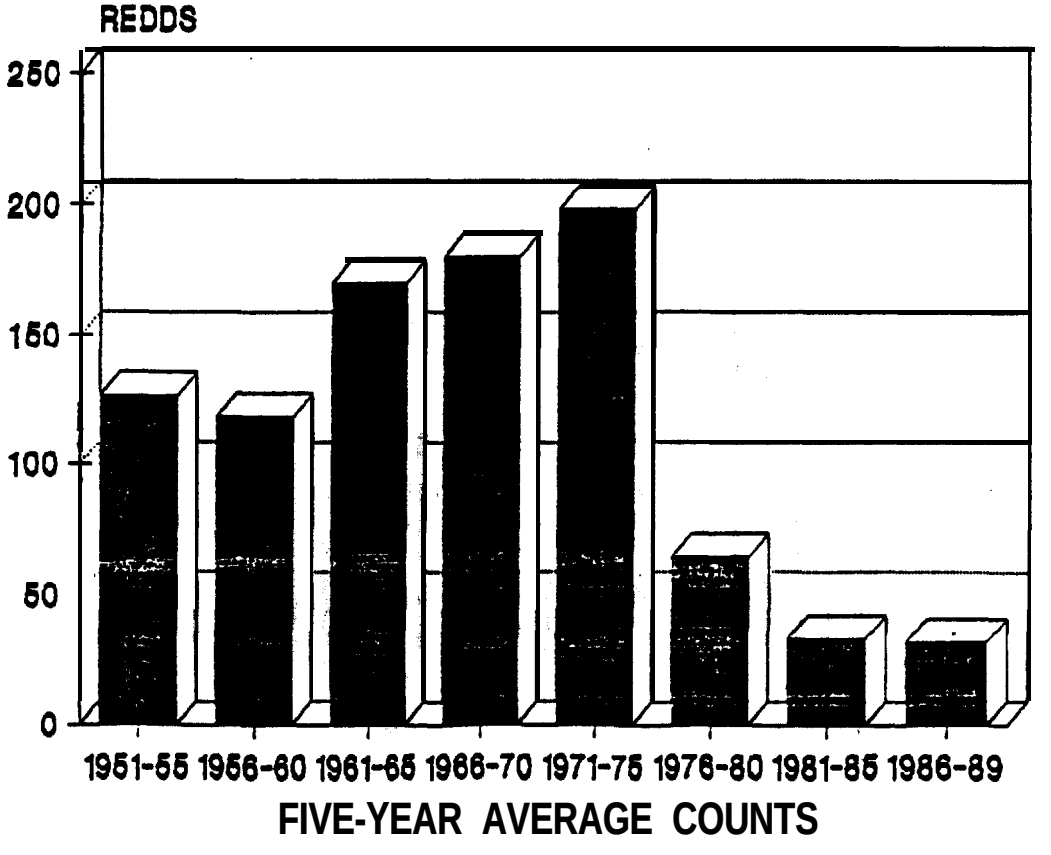
1/ Aerial count was not completed in 1988 due to **severe** wilderness fire activity.

2/ **Redd** counts in parenthesis were on-the-ground observations of the 3,000 meter reach of the Meyers Cove Project area.

Table . Five-Year Average Chinook Salmon Redd Counts in **Camas** Creek. Averages are *from* aerial counts conducted by the Idaho Department of Fish and Game.

CHINOOK SALMON
REDD COUNTS BY FIVE-YEAR AVERAGE

Years	**Count**
1951-55	127
1956-60	119
1961-65	170
1966-70	*180*
1971-75	198
1976-80	65
1981-85	33
1986-89 1/	32



1/ Four-year average. Includes the 1988 on-the-ground count completed by Forest Service personnel when aerial count was not available.

Table 6. Summary of extensive anadromous fish habitat inventory completed in October, 1989.

SUMMARY REPORT: CAHAS CREEK HABITAT INVENTORY

SURVEY AREA: CAHAS CREEK, FROM SWING FENCE ABOVE HINE PROPERTY UPSTREAM TO VEHICLE CROSSING ACCESSING CASTLE CREEK.
NUMBER OF REACHES: 3

SURVEYED BY: T. HARDY DATE: 10 OCTOBER, 1989

CAMAS CREEK - HABITAT TYPE INVENTORY - STREAM SUMMARY

LENGTH (M)		WIDTH (M)		AREA (SQ M)		MISC.	
RIF	1336.2	AVG R	9.9	RIF	13729.6	AVG STRM DPTH	0.4 (M)
POOL	625.8	AVG P	8.3	POOL	5266.6	AVG POOL QLTY	2.7
GLIDE	775.1	AVG G	9.3	GLIDE	7512.2	R:P RATIO	1.1
PW		AVG PW		PW		AVG VELOCITY	0.6 (M/S)
BW		AVG BW		BW	104.0	T. SPAWN AREA	322.0 SQM
TOT	2737.1	AVG W	9.1	TOTAL	26612.5		
SC	298.2	AVG SC'	1.2	SC	619.0		

TOTAL INSTREAH COVER (SQ M)

WOOD	TURB	VEG	BANK
233.4	145.8	18.1	33.7

SUBSTRATE COMPOSITION (%):

SAND	GRVL	CBBL	BLDR	BDRX
14	24	44	16	2

Camas Creek was surveyed exactly in accordance with the 1989 BPA Anadromous Fish Project Survey Instructions. Rearing habitat quality and quantity is severely lacking in the three reaches surveyed for this project. The pools that exist have no in-stream cover. Stream canopy/shade and food sources are scarce because of degraded riparian conditions.

The percent substrate composition listed above represents the existing conditions of the stream as related to the lack of rlparian vegetation. As the streamside vegetation was depleted, the banks failed and increased channel width. This resulted in increased water velocity, decreased depth, and an Increase of sediment into the spawning gravels.

Riffle/pool ratio calculation:
(riffle area + pocket-water area)/(pool area + glide area)

Table 7. Juvenile densities of chinook salmon and steelhead trout in Meyers Cove reach of Camas Creek from 1984 to 1989. 1/

DATE SNORKELED	SECTION 2/	CHINOD ($PER M^2$) 3/	STHD1D ($PER M^2$) 4/	STHD12D ($PER M^2$) 5/
08/16/84	1	0.79	0.21	0.84
	2	1.27	1.35	1.61
08/28/85	1	3.01	1.65	1.95
	2	3.61	0.89	0.89
08/28/86	1	10.00	4.34	4.67
	2	5.25	0.43	0.43
1987	NO DATA RECORDED	0.00	0.00	0.00
08/25/88	2	2.13	0.69	0.69
08/23/89	1	4.15	0.68	0.68
	2	0.42	0.00	0.07

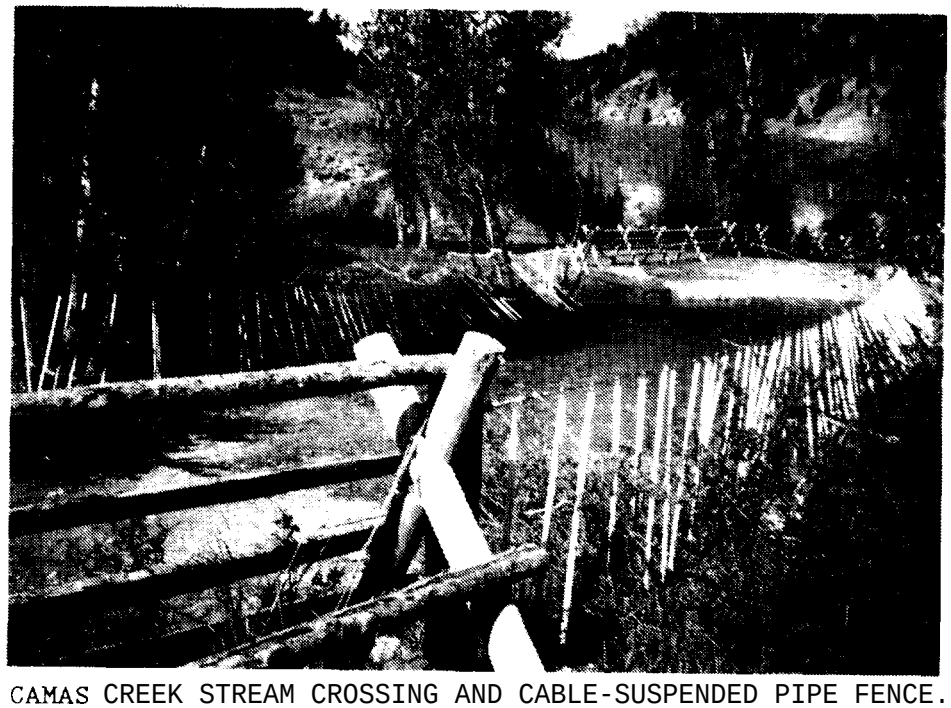
ANNUAL AVERAGES OF
SNORKEL SECTIONS 1 AND 2

YEAR	CHINOD	STHD1D	STHD12D
1984	1.03	0.78	1.23
1985	3.31	1.27	1.42
1986	7.62	2.38	2.55
1987	0.00	0.00	0.00 6/
1988	2.13	0.69	0.69 7/
1989	2.29	0.34	0.38

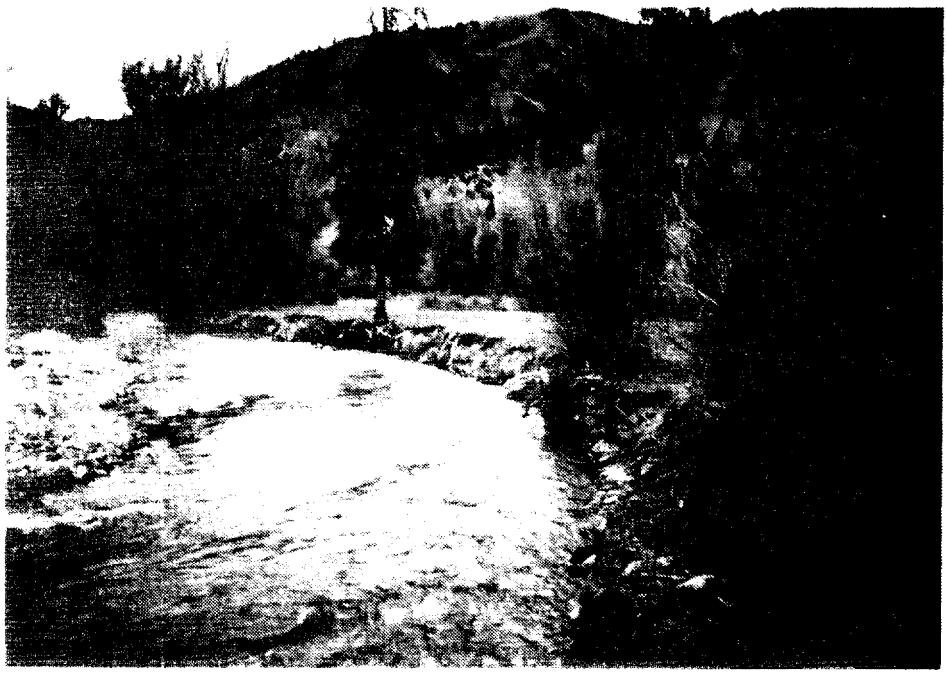
1/ Data was included in personal letter received from Idaho Department of Fish and Game, Fishery Research Laboratory, Eagle, ID.
2/ Section 1 is near locked gate on Forest Service Road #108. Section 2 is at the trail head sign, 1 mile downstream from the locked gate. Both sections are "C" type channels and data will be directly related to adult escapement, embryo survival, and fry emergence.
3/ CHINOD = age 0+ chinook salmon juveniles.
4/ STHD1D = age 1+ steelhead trout juveniles.
5/ STHD12D = ages 1+ and 2+ steelhead trout juveniles.
6/ Survey crew arrived too late in 1987 and parr had moved out of summer habitat.
7/ Section 1 was omitted in 1988 snorkeling schedule.

APPENDIX C: Photographs

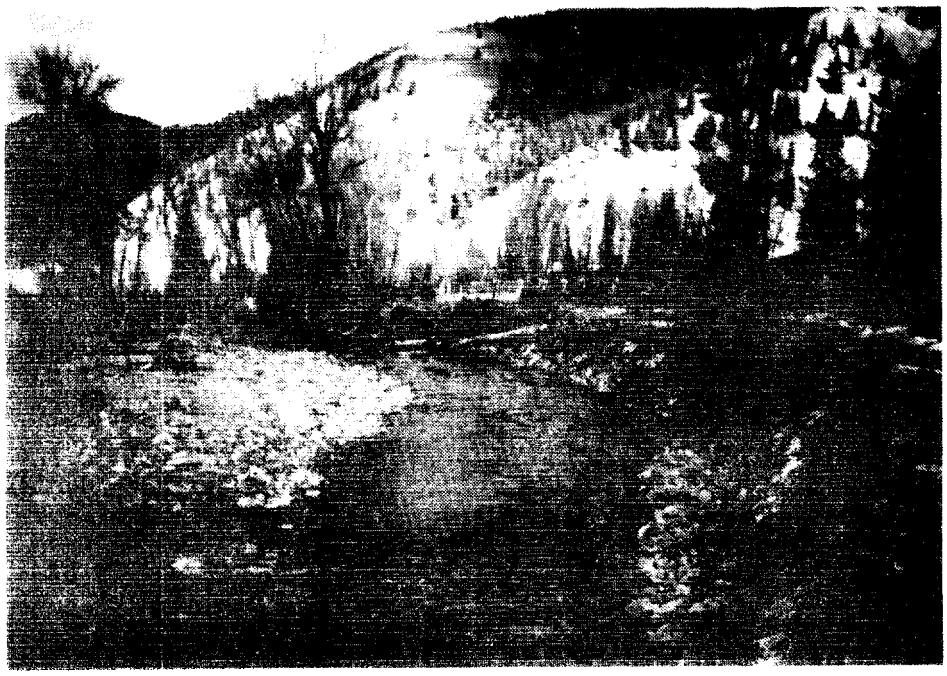
MEYERS COVE RIPARIAN FENCE, CONSTRUCTED IN 1988-89.

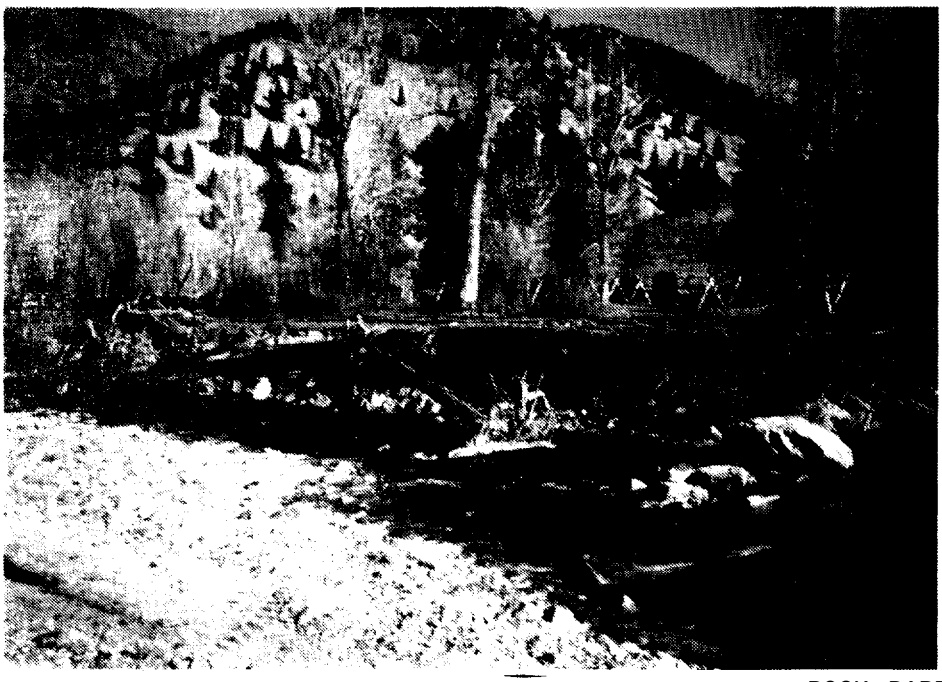


CAMAS CREEK STREAM CROSSING AND CABLE-SUSPENDED PIPE FENCE. IN 1990, AN ELECTRIC FENCE SYSTEM WILL BE ADDED, USING A PORTABLE. BATTERY-POWERED CHARGER AND WIRE-INTEGRATED ROPE.



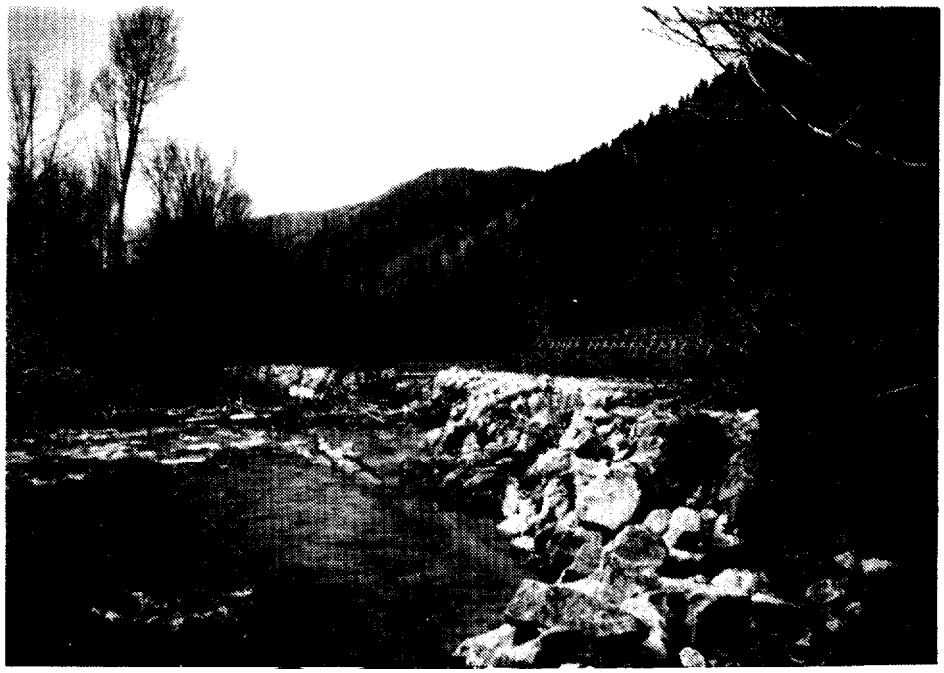
PHOTOGRAPHS OF SITE 2-88. UPPER PHOTOGRAPH WAS TAKEN EARLY JUNE, 1988. STANDING DEAD LODGEPOLE PINE (CENTER) WAS UP-ROOTED IN LATE JUNE. LOWER PHOTOGRAPH WAS TAKEN NOVEMBER 1989, PRIOR TO COMPLETION OF STABILIZATION WORK. LOGS ARE ANCHORED TO DEFLECT WATER AND PROVIDE REARING COVER.





PHOTOGRAPH OF SITE 2-88 TAKEN IN NOVEMBER, 1989. ROCK BARB AT RIGHT. TOP END OF LOG WITH ROOT-WAD (CENTER) WAS FLIPPED AND ANCHORED AT BASE OF ROCK BARB, LEAVING ROOT-WAD IN APPROXIMATELY THE SAME LOCATION.

LOOKING DOWNSTREAM AT SITE 2-88. ANCHORED LOG AND ROCK WORK ON UNDER-CUT BANK (FOREGROUND) WAS COMPLETED IN 1.988. ANCHORED LOGS IN BACKGROUND AND TRANSPLANTING WILLOW CLUMPS AND CUTTINGS WAS WORK COMPLETED IN 1989



SITE 1-88. STREAMBANK/HABITAT IMPROVEMENT WORK COMPLETED IN 1988. RIP-RAP PROTECTS FAILING, NON-VEGETATED STREAMBANK. DEBRIS JAM (BACKGROUND) HAS BEEN ANCHORED IN PLACE AND PROVIDES 50 M^2 OF BACKWATER AND COVER FOR REARING HABITAT.

FAILING STREAMBANK IN LOWER REACH OF PROJECT. TYPICAL STABILITY PROBLEM OF STREAMBANKS LACKING WOODY VEGETATION OCCUR THROUGHOUT THE 3000 METER REACH OF CAMAS CREEK.

APPENDIX D: Project Cost Estimate

APPENDIX D

Project Cost

Total costs incurred by the Bonneville Power Administration on the Camas Creek Anadromous Habitat Improvement Project are listed below. Annual costs are delineated to show the anticipated implementation of specific enhancement activities for fiscal years 1989-91.

Budget for Camas Creek (Meyers Cove) Anadromous Species Habitat Improvement Project.

	EXPENDITURES		ESTIMATED COSTS		
LINE ITEM	FY-87	FY-88	FY-89	FY-go	FY-91
Personnel	$ 4,259	$11,500	$21,250	$ 2,400	$ 2,400
Travel					
Vehicles & Per Diem	1,215	1,348	3,160	260	260
Enhancement Activities					
Phase I					
A. Feasibility and Design Study	COMPLETED 1986				
Phase II					
A. NEPA Process	2,301				
B. Riparian Fencing	19,056				
C. Water Developments					
D. Stream Crossings		9,149			
E. Riparian Fertilization		207	695	480	480
F. Bank Stabilization & Stream Cover		3,200 4,967	4,125		
G. Cattle Guard/Installation					
H. Metal Gates		'577			
I. Maintenance		1,200	1,200	850	850
J. Evaluation and Monitoring		1,000	1,000	700	700
Annual Sub Totals	$26,831	$33.148	$33.430	$ 4,690	$ 4,690
Forest Administrative costs (12.9%)	3.461	4,267	4,312	605	605
ANNUAL TOTALS	$30,292	$37 .424	$37.742	$ 5,295	$ 5,295
TOTAL PROJECT COST					$113,790

ATTACHMENTS

ATTACHMENT I

ALLOTMENT MANAGEMENT PLAN
CAMAS CREEK C&H ALLOTMENT

I. OBJECTIVES

The management objectives for this plan are to protect and improve the resources and control livestock numbers so that livestock use is within the grazing capacity. That capacity is focused on the varied riparian areas which may not be grazed in excess of 45 percent.

A. Improve the following areas of suitable range in less-than-good condition to good or better range condition by the year 1997.' These areas, as documented in the Range Condition and Trend Table, are:

- Dry meadow - 150 acres
- Sagebrush - 572 acres
- Browse/shrub - '1016 acres
- Coniferous timber - 752 acres

B. Manage anadromous fish habitat to supply and maintain 90 percent or more of its inherent smolt production capability. According to the Idaho Department of Fish and Game, Sub-basin Planning Section, Boise, Idaho, the stream channel in question has a potential smolt production of 32,000 spring and summer Chinook salmon.

C. Minimize conflicts between cattle and wildlife by restricting livestock grazing to the acceptable level of 45 percent in the riparian areas.

II. ACTION

The above objectives, number of acres of suitable range, and erratic terrain of the allotment comprise several very unique problems, To solve these problems and continue grazing, we have developed a deferred rotation grazing system. The rotation schedule will be as follows:

	Silver Creek Unit 1	West Fork Unit 2	Upper Camas Unit 3
1990	07/01-07/10	06/20-06/30	06/01-06/20
1991	06/10-06/20	06/01-06/10	06/20-07/10
1992	06/01-06/10	07/01-07/10	06/10-06/30

Please review the range allotment map and appendix for grazing unit boundaries. The grazing periods for each unit are only tentative. At any time the 45 percent consumption is reached, the stock will be moved on to the next pasture. If the final pasture is being grazed, the livestock will be removed from the allotments.

The above three-pasture deferred rotation system is shown with one and one half cycles. This system allows each pasture to complete a full growth cycle once every three years.

The two pasture system is divided by Camas Creek. Pasture 1 is the Silver Creek drainage with a small related area on the north side of Camas Creek. Pasture 2 includes the West Fork of Camas Creek and a portion of the Camas drainage above Meyers Cove.

This plan will be implemented through development of an Annual Operating Plan which implements specific action for that particular year. The annual operating plan becomes a part of this management plan once prepared.

A number of improvements currently exist on the allotment. Following is a list of the improvements and their locations:

Fences:

Inform Number - 1301 Camas Creek Allotment Sections 5, 6, T17N, R17E
- 1020 Camas Drift section 16, T17N, R17E

These existing improvements will be utilized to distribute livestock for effective utilization of the forage. They also provide for a deferred grazing system which is the desired management program.

The riparian fencing and unit division fences have been reconstructed in cooperation with Bonneville Power Administration. Several more improvements need to be built to insure proper range utilization. The unit fencing has all but eliminated water in several of the pastures. These sources will be replaced with two water tanks.

At the same time, we have the opportunity to enhance range condition and wildlife carrying capacity by seeding and fertilizing the old hay meadow.

Following is a schedule of completion for the above improvements:

Water Development FY 1991

Fertilize (37 acres) FY 1990

Reseed (37 acres) FY 1990

For specific locations of the proposed developments, please see the attached map. Maintenance of all improvements will be the responsibility of the permittees.

This plan will be maintained annually and its success will be evaluated at the end of each grazing season. At this time, any changes necessary to meet the objectives of the plan will be made as well as adjustments in carrying capacity, should this be needed. If the management objectives are met, the plan will be followed as is and monitored through annual allotment inspections.

III. EVALUATION

Implementation of the deferred rotation grazing system will, to'a great extent, provide the means for achieving the stated goals and objectives. The installation of the proposed water developments, fences, and completion of the seeding and fertilizing will also improve distribution and utilization. A deferred rotation system adequately meets 'the physiological needs of desirable vegetation by utilizing the plants before seed-ripe only once out *of* every three years. Thus grazing in the deferred units takes place after the root system is built up and seed production is complete. Advantages for this deferred rotation system relating to riparian areas, water, fisheries, and wildlife are outlined in the Environmental Assessment for the **Camas** Creek C&H Allotment. In order to monitor the success *of* the plan in meeting the objectives, the following measures will be taken:

A. Establish a photo transect inside and outside the fenced riparian area on **Camas** Creek. This can include any fishery studies the Fisheries Specialist may deem necessary. These studies will be read in 1990, reread in 1992, and 1994.

B. **Two** site analysis transects will be run in 1990 and again in 1992, in order to monitor objectives number one. One occurs in the Meyers Cove area (Transect FT-8). The other occurs along the northeast side of Furnace Creek (Transect **FT-15).** These sites were selected because they occur in regularly used key areas **that** will indicate whether the deferred system is meeting the objectives fo **the** AMP.

C. The grazing program will be reviewed annually on-the-ground to monitor utilization and to check on compliance with the Annual Operating Plan. **The** use intensity will be mapped.

The follow-up for this plan will be monitored with the following schedule:

	Date Planned	Date Accomplished	Signature
Install transect photo on **Camas** Creek	1990		
Reread	1992		
Reread	1994		
Site analysis transects	1990 1995		

If a change is deemed necessary, amendments to this plan may be proposed and evaluated at any time.

IV. PROPER USE CRITERIA

Proper use criteria have been identified by an Interdisciplinary Team. Proper utilization will be 45 percent of total forage in all units. This will meet the physiological requirements of forage plants under a deferred rotation grazing system.

When proper use has been met in a pasture, the livestock will be moved to another pasture or if the stock is in the final unit, it will be removed from the allotment. No attemp has been made to identify key species, because utilization is in terms of all forage species. When overall consumption has reached 45 percent in the riparian areas grazing will be stopped.

ATTACHMENT II

MONITORING PLAN
CAMAS CREEK ANADROMOUS SPECIES IMPROVEMENT PROJECT

The monitoring program consists of periodic visual inspections of the project area, maintaining established photopoints, monitoring chinook salmon and steelhec trout spawning, and an annual comprehensive habitat inventory. This program is designed to ensure habitat enhancements identified for Camas Creek and Meyers Co are accomplished and result in attaining the goal of increasing vigor, vitality, and quantity of migrating spring and summer chinook salmon and summer steelhead trout.

VISUAL INSPECTIONS

Observations of project structures:
- in-stream structures should be viewed during and after high water to determi maintenance needs
- annual pre-season inspection of riparian fences and, if necessary, repairs
- weekly inspection of riparian exclosure for trespass cattle

PHOTOPOINTS

Monitor response, over time, of:
- revegetation of riparian area, effects of fencing, fertilizing, and non-grazing
- streambank stabilization structures, photographs should be taken during and after high water

REDD COUNTS

"On-the-ground" count and map chinook salmon redds, once per week for a minimum I three weeks, in the two-mile reach of the Camas Creek-BPA Project. Begin counts the second week of August and continue through the first week of September. Staggering counts over a three-week period will show changes over time in number: of redds, pinpoint peak spawning activity, and identify multiple redds. Count a map redds beginning as upstream vehicle crossing and continue downstream to swinging fence/wire gate below the locked gate. Note sex, plus live and dead spawners. Collect mortality statistics for Idaho Department of Fish and Game: measure total length (TL), fork length (FL), and hypural length (HL); and scrape scales for age determination.

Most often steelhead redd counts in Camas Creek are not feasible due to turbidities during spring runoff. Visual ground counts of adult steelhead and redds can be successful in West Fork-Camas Creek and Silver Creek. Populations and spawning activities should be monitored and numbers recorded for documenting in reports.

HABITAT INVENTORIES

This extensive inventory will collect data on existing or potential habitat for use by steelhead trout and chinook salmon. The data collection will be consiste with other Bonneville Power Administration funded anadromous fish habitat survey: being completed on National Forest System Lands in Region 4. Physical habitat monitoring will be coordinated with Project 83-7, Idaho Department of Fish and Game who conducts fish population monitoring. The inventory data and population densities are formulated to produce smolt estimates listed in Table 1, Camas Cre Anadromous Species Habitat Improvement Project, 1989 Annual Report.